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Nº 112

14950

Economic Intelligence Memorandum

THE SOVIET PRICE STRUCTURE
AND THE RATIO OF MILITARY EXPENDITURES
TO GROSS NATIONAL PRODUCT



CIA/RR EM 61-11

12 June 1961

CIA HISTORICAL REVIEW PROGRAM
RELEASE IN FULL 1998

CENTRAL INTELLIGENCE AGENCY
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THE SOVIET PRICE STRUCTURE
AND THE RATIO OF MILITARY EXPENDITURES TO GROSS NATIONAL PRODUCT*

Summary

It is frequently stated that existing estimates of the cost of Soviet military expenditures, calculated as the ratio of military outlays to gross national product (GNP),** would increase substantially (perhaps double) if Soviet prices reflected costs in the Western sense. This memorandum shows that very large hypothetical changes in price relationships among categories of final goods and services,*** chosen specifically for their tendency to increase the ratio of military expenditures to GNP, would not affect the ratio by more than two or three percentage points.

Therefore, although it is a rough measure of cost, the ratio of military outlays to GNP is a convenient and useful approximation of the proportion of a country's resources devoted to the military sector. It must be emphasized, however, that military expenditures do not represent military power in any absolute sense, and, of course, neither do ratios of military expenditures to GNP.

* The estimates and conclusions in this memorandum represent the best judgment of this Office as of 15 May 1961.

** The term burden is often used to describe this ratio. In this memorandum the term cost or the phrase relative allocation of resources will be used so as to avoid any implication that the subjective effect of military expenditures (the extent to which a population feels that it is burdened) can be measured either by such ratios or by the absolute value of military expenditures.

*** The difference between the prices paid by civilian and military purchasers for similar military and nonmilitary products is believed to be negligible (see the first footnote on p. 5, below).

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I. Introduction

Attempts have been made repeatedly to devise a method for measuring the cost of the Soviet military program, but the estimates that have been derived thus far have been objected to on the ground that Soviet prices tend to understate the "true" magnitude of military expenditures. This memorandum discusses the concepts underlying one measure of this kind -- the ratio of military expenditures for final goods and services to GNP -- and examines its applicability to Soviet data. The reliability of this measure is then evaluated by comparing hypothetical prices for goods and services with actual prices in order to test the dependence of this ratio on the price structure that underlies the existing estimates of Soviet GNP.

II. Concept of the Cost of Military Programs

The cost of a military program can be defined as the share of the national product claimed by the program.* For international comparisons this cost is often measured in terms of the ratio of military expenditures for goods and services to GNP (the value of the total output of goods and services). ¹/_{**} This memorandum examines the validity of this ratio. The use of this ratio implicitly assumes that the value of the product in the military sector can be compared with the value of the product in the civilian sector -- that is, the price of any product equals its opportunity cost (the value of an alternative product that is sacrificed by producing an additional unit of a particular product).

The validity of the assumption referred to above depends on (1) the extent to which the prices paid for final products both in and out of the defense sector actually measure the relative desirability of these goods and services as established by the interaction of consumers or the dictates of a planning authority and (2) the extent to which the prices reflect the full costs of the resources used in producing the goods and services. When satisfied, these conditions imply that the price of a product equals the value of the product foregone at the margin.***

* Military programs have implications for an economy other than the denial of the alternative products that could be produced with resources allocated to the military sector. For example, by providing purchasing power but neither the goods for which it can be spent nor the means of producing goods, outlays for these military programs create inflationary pressures. For the purpose of this memorandum, however, these and similar problems involved in supporting military programs are not relevant and will not be pursued further.

** For serially numbered source references, see the Appendix.

*** More precisely, the price of the final product must equal the marginal cost, and the marginal cost must [footnote continued on p. 4]

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The ideal conditions necessary for equality of prices and opportunity costs are not satisfied in any economy, nor are they likely ever to be met. In all countries the compilations of GNP are subject to the criticism that they do not reflect fully and accurately the relative economic cost of producing the array of final goods and services. The gap between the ideal and the real is greater in the USSR than in Western economies, for prices in the USSR vary widely and unevenly from opportunity costs. Nevertheless, the difference is one of degree, and useful comparisons of GNP aggregates may appropriately be made within or between economies. Such comparisons are made regularly by several organizations -- the UN, NATO, and the ECE, for example -- and are valuable if appropriate caution is observed in interpreting them.

Before proceeding to the specific objections made to estimates based on Soviet price relationships, two additional points must be made. It is not legitimate to argue that a transfer of large quantities of resources from the military sector to the civilian sector would necessarily increase the value of civilian output as much as it reduces the value of military output. Even if prices equal opportunity costs before the transfer is made, this equality depends on a given allocation of resources and holds true only for small changes in this allocation. Large-scale reallocations of resources would change price relationships among final products because of differences in production functions and demand schedules between the civilian and the military sectors.

In addition, it must be emphasized that the cost of military expenditures to a given country can be expressed validly only in terms of that country's own prices. Some estimates of the cost for the USSR seem to have been derived from dollar valuations of both Soviet military expenditures and Soviet GNP and have resulted in ratios of Soviet military expenditures to Soviet GNP that are considerably higher than the equivalent ratio based on ruble values. Because dollar valuations of Soviet GNP reflect the cost structure of production in the US, and not in the USSR, it would be only accidental if the valuations measured the economic cost that defense expenditures impose on the Soviet economy.*

equal the prices that have to be paid for the quantities of all the factors of production required to produce an additional unit of output. If the prices paid to all factors of production are equalized throughout the economy through some sort of bidding process, the transfer of small quantities of factors from one employment to another subtracts as much from the value of the total output as it adds to it, and prices are equal to opportunity costs.

* Differing relative costs reflecting different resource endowments and technologies and differing demand [footnote continued on p. 5]

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III. Objections to Estimates Based on Soviet Price Relationships

A number of economists have argued that the cost of Soviet military expenditures cannot be estimated, because of shortcomings in Soviet prices and in other available data. These writers maintain that the Soviet prices or expenditures used in calculating GNP, and the division of GNP by end use, do not meet the requirement that the value of output should equal the costs of producing output throughout the economy.* 2/ As stated above, this idealized requirement is not fully met in any economy, but there are reasons for believing that the failure is particularly striking in the case of the USSR. The question is whether these shortcomings seriously affect the measurement of the cost of the Soviet military effort, within the limits of the purpose of such a measure.

It is beyond the scope of this memorandum to inquire into what a rational pricing system might imply for the valuation of Soviet GNP or whether or not competitive market norms can be applied properly to the USSR.** This memorandum summarizes instead some of the principal objections to existing calculations of Soviet GNP -- objections that have been made on the grounds that the calculations do not give a valid picture of the relative costs of production. This memorandum also attempts to judge the possible effect that taking these objections into account might have on existing measurements of the ratio of military expenditures to GNP.

One objection centers on the distortions introduced by indirect taxes and subsidies when Soviet GNP is calculated in market prices, leading to an overstatement of the prices of consumer goods relative to the prices of producer goods. Nove describes the effect of the turnover tax, the primary offender, on the price structure in the following manner:

structures between the two economies would logically lead to significant differences in their price structures. That the "true" Soviet price structure would closely resemble the actual US price structure would be only accidental.

* These criticisms refer to distortions in the price structure among categories of final output and do not consider distortions within the categories. As to the latter point, the position of this memorandum, based on available evidence, is that price discrimination in favor of military purchases is not sufficiently important to be considered.

** For a discussion of this problem, see source 3/.

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It is broadly true to say that producer goods prices are related to, and usually intended to cover, their cost of production, while consumer goods prices should be in principle related to demand; the difference between the cost of production and this "supply and demand" price equals turnover tax, plus (to a smaller extent) profits. ... The high prices of consumer goods enable the state to finance investment and other "non-consumption" expenditure while restricting effective demand to the consumer goods which it decides to make available. 4/

This distortion can be remedied in part by adjusting GNP for turnover tax and subsidies, provided that these taxes and subsidies can be allocated by industry or product.

Although calculations of GNP can be adjusted to represent factor costs as the USSR computes them, a fundamental problem remains -- the extent to which Soviet prices do not include the full costs of production. There is general agreement that amortization of capital is understated in calculating the average cost of Soviet production. 5/ Here again the impact of such an understatement would affect the capital-intensive industries and, therefore, the producer goods industries most heavily. It is argued further that prices in consumer goods industries contain a larger profit element than in producer goods industries. 6/ As it is hardly likely that such a situation reflects genuine differences in the quality of management or the degree of risk, the larger profit in consumer goods also would cause an understatement of the prices of producer goods in relation to the prices of consumer goods.*

Perhaps the most persuasive objection to estimates based on Soviet pricing practices consists of the fact that almost no rent is charged for the use of land or interest for the use of investment funds. 7/ The existence of this practice is an additional reason for believing that the prices of producer goods should be raised relative to those for consumer goods to bring prices into line with the average costs of production.

The reasoning above, restricted as it is primarily to capital and land, assumes that in the labor market the prices paid to factors tend to be equal in alternative employments. Although this assumption would have been unrealistic for some periods of Soviet history, for the period since Stalin's death it probably would not be too unreasonable.

* In a market economy, one would normally expect a transfer of resources out of the production of producer goods into the production of consumer goods should such a situation exist, thus forcing the prices of consumer goods down and leading to a rise in the prices of producer goods.

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There is now much less direct interference with labor mobility, and it is assumed, therefore, that relative wages and the labor market are so close to equilibrium that they can be ignored for the purposes of this memorandum.

In spite of the validity of the objection outlined above, there is no practical basis for adjusting estimates of Soviet GNP (stated in market prices) to meet them (although some distorting effects can be removed by subtracting indirect taxes and adding subsidies). For this reason, an indirect approach must be used to evaluate declarations such as the following: "... It seems likely that the figure of 14.2 percent of GNP [for 1955] ... drastically underestimates the proportion of real resources used for national security purposes." 8/

IV. Evaluation of the Ratio of Military Expenditures to GNP

Estimates of Soviet GNP for 1950 and 1955-58 have been constructed, both in established prices and adjusted as indicated above. 9/ Military expenditures represent a larger share of GNP when GNP is adjusted for indirect taxes and subsidies than when GNP is calculated in established prices because the military sector uses a smaller proportion of those goods subject to high rates of indirect taxation. The following tabulation compares (for 1950 and 1955-58) the ratios of military expenditures to GNP on an established price basis with those calculated on an adjusted factor cost basis:

	Billion Current Rubles*				
	1950	1955	1956	1957	1958
GNP at established prices					
Military expenditures	100	140	145	150	150
GNP	1,055	1,320	1,435	1,550	1,685
Ratio of military expenditures to GNP (percent)	(9.5)	(10.6)	(10.1)	(9.7)	(8.9)
GNP at adjusted factor cost					
Military expenditures	80	120	120	130	130
GNP	690	980	1,040	1,130	1,245
Ratio of military expenditures to GNP (percent)	(11.6)	(12.2)	(11.5)	(11.5)	(10.4)

* The use of any ruble-dollar ratio in this memorandum would be inappropriate inasmuch as a separate ruble-dollar ratio exists for each commodity and the application of any ratio would distort the relationship between defense expenditures and GNP (see the third paragraph on p. 4, above). All values have been rounded to the nearest 5 billion rubles.

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The estimates of GNP include breakdowns by end use -- consumption, investment, defense, administration, and other. By rearranging the accounts, it is possible to compute a rough estimate of five major types of final products entering into these end uses -- food, machinery and equipment, construction, materials and miscellaneous manufactured goods, and personal services and utilities.* For the purpose of this memorandum, in testing the effect of further relative price changes, it is sufficient to work with this fivefold breakdown in the military sector and in the total economy, as shown in Table 1.**

A ranking of the major types of final product according to this relative importance in military expenditures compared with their relative importance in GNP for these 5 years shows the following:

	Percent of Military <u>Expenditures</u>	<u>Percent of GNP</u>
Machinery and equipment	40	15
Personal services and utilities	31	20
Materials and miscellaneous manufactured goods	19	18
Food	6	33
Construction	4	15

Because of the differences in the distribution of final output between the military and civilian sectors, it is evident that any increase in the prices of the final output of machinery and equipment, personal services and utilities, and materials and miscellaneous manufactured goods would increase the share of military expenditures in GNP. It is this sort of adjustment that critics have in mind when they insist that existing estimates of the proportion of Soviet resources channeled into military programs are grossly understated.

* The appropriation and capital accounts of the household, agricultural enterprise, nonagricultural enterprise, and government sectors were allocated according to type of final product (consumption and investment). Capital repairs and new fixed investment were allocated to construction and machinery and equipment on a 62 to 38 basis. Expenditures for military procurement and operation were allocated by end product according to estimates compiled in this Office. The adjustment necessary to eliminate the effect of indirect taxes and subsidies was prorated among the end uses by type of final product following the guidelines established in Appendix F of Soviet National Accounts. 10/

** Table 1 follows on p. 9.

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Table 1

Soviet Expenditures on Final Product at Adjusted Factor Cost 1950 and 1955-58

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a. All values have been rounded to the nearest 5 billion rubles.

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The importance of this alleged understatement can be tested rather readily. Relative prices of final output can be manipulated by assuming a set of hypothetical price increases in the product sectors that would increase the ratio of military expenditures to GNP. The cumulative effect of such an adjustment of this ratio provides an insight as to the dependence of the ratios on the set of price relations embodied in existing estimates of Soviet GNP.

Revisions of the value of final output along these lines show that it is unlikely that the ratios would be affected materially. Item 1 of Table 2* gives the ratio of military expenditures to adjusted GNP. If the prices of machinery and equipment were doubled, this ratio would increase about two points, as shown in item 2. A change of this magnitude can hardly be considered large, in view of the gross nature of the measure.

None of the objections cited above has suggested that the return to personal services, by far the largest part of the services and utilities sector, is underpriced relative to other components of GNP. The possibility could be raised, however, that an increase in the value of the services and utilities sector would raise the ratio of military expenditure to GNP. Such an increase would seem unjustified. Because of the relatively free mobility of labor, the returns to personal services in this sector are related to the wages paid in other sectors. Therefore, an upward revision of the wage component of services and utilities might require a like increase in the wage component of each of the other product sectors, partly negating the effect of an increase in the value of services and utilities. Moreover, the average pay and allowances and payment in kind (except housing allowances) for personnel of the Ministry of Defense and the Militarized Security Forces exceeds the average annual earnings of workers and employees in state enterprises, organizations, and institutions in each of the 5 years. Thus, before any general adjustment in this sector could be made, the personnel costs of the military sector probably should be revised downward to reflect what military personnel could earn in the civilian economy. This procedure would reduce the difference in the importance of personal services and utilities as between the military sector and the economy as a whole and would dampen the impact of any general revision of prices in this sector.

The category "Materials and miscellaneous manufactured goods" covers a wide variety of final output. Because production of this output probably is quite capital-intensive, a large increase (50 percent) in the price of this output is incorporated, and the result of this change, added to the effect of the posited change of 100 percent in the prices

* Table 2 follows on p. 11.

Table 2

Ratio of Soviet Military Expenditures to GNP
at Adjusted Factor Cost
1950 and 1955-58

	Percent				
	<u>1950</u>	<u>1955</u>	<u>1956</u>	<u>1957</u>	<u>1958</u>
1. No price adjustments assumed	11.6	12.2	11.5	11.5	10.4
2. Prices of machinery and equipment increased by 100 percent	13.5	14.8	14.2	14.2	12.9
3. Prices of machinery and equipment increased by 100 percent; prices of materials and miscellaneous manufactures increased by 50 percent	13.4	14.7	13.9	14.2	12.8
4. Prices of machinery and equipment increased by 100 percent; prices of materials and miscellaneous manufactures increased by 50 percent; prices of construction increased by 25 percent	13.2	14.3	13.6	13.8	12.5

of machinery and equipment, is shown in item 3. As Table 2 indicates, the over-all effect of this latter adjustment is to leave essentially unchanged the ratio of military expenditures to GNP compared with the level obtained by raising machinery and equipment prices alone.

These extreme adjustments do not consider the relevance to the value of construction of the assumed understatement of cost in the capital-intensive sectors. Certainly the cost of steel for construction would be raised by increases in the prices of machinery and equipment. 11/ Many other building materials would be affected

similarly. Price increases in this sector, however, would tend to restore the original ratio between military expenditures and GNP. For example, if prices were raised 25 percent in construction and if the impact of this change were added to the other changes, the ratio would fall in every one of the years as illustrated in item 4 of Table 2. The larger the increase in prices of construction output, the greater is the decline in the ratio.

Also of interest is the fact that the adjusted ratios are not very responsive to changes in the composition of defense expenditures during the years studied in this memorandum. Although machinery and equipment accounted for a much larger percentage of military outlays in 1956-58 than in 1950 and 1955, this change in composition had little impact on the effects produced by adjusting the prices of machinery and equipment.

The effect of other combinations of price adjustments could be tested, but the adjustments already discussed demonstrate the relatively modest effect that they would have on the measurement of the economic cost of military expenditures. Although the breakdown of final output within the military sector and GNP is admittedly crude, it would take rather drastic rearrangement of expenditures and prices to push the ratio of military outlays to GNP much higher than that shown in item 2 of Table 2. The reason is that the military sector does not differ enough from the economy as a whole in its pattern of demand for final output of the goods and services. The situation would be quite different if the focus were shifted to the ratio of investment to GNP. Here hypothetical increases of 100 percent in machinery and equipment prices and 50 percent in construction prices change the share of investment in GNP for 1956 from 29 percent to 37 percent.

The conclusion to be drawn from the analysis, then, is that the cost of the Soviet military program, as measured by the ratio of military expenditures to GNP, is not seriously misstated, provided adjustments are made for indirect taxes and subsidies.* Although the ratio is not a precise measure of cost, it satisfies reasonable demands placed on it. Military expenditures do not represent military power in any absolute sense, and, of course, neither do ratios of military expenditures to GNP. It would be irrational for one country to design its defense policy with reference to the ratio of defense expenditures to GNP in another country. The usefulness of the ratio appears to be limited to providing a reasonable approximation of the proportion of a country's resources devoted to the military sector.

* This conclusion is dependent on the substantial validity of the judgment that price discrimination in favor of military purchases is not sufficiently important to be considered (see the first footnote on p. 5, above).

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APPENDIX

SOURCE REFERENCES

Evaluations, following the classification entry and designated "Eval.," have the following significance:

<u>Source of Information</u>	<u>Information</u>
Doc. - Documentary	1 - Confirmed by other sources
A - Completely reliable	2 - Probably true
B - Usually reliable	3 - Possibly true
C - Fairly reliable	4 - Doubtful
D - Not usually reliable	5 - Probably false
E - Not reliable	6 - Cannot be judged
F - Cannot be judged	

"Documentary" refers to original documents of foreign governments and organizations; copies or translations of such documents by a staff officer; or information extracted from such documents by a staff officer, all of which may carry the field evaluation "Documentary."

Evaluations not otherwise designated are those appearing on the cited document; those designated "RR" are by the author of this memorandum. No "RR" evaluation is given when the author agrees with the evaluation on the cited document.

Except for CIA finished intelligence, all sources are evaluated RR 1 unless otherwise indicated.

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